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(71) Applicant(s)

David Graham Taylor
Birch House, Broadwater, CRANLEIGH, GU6 7LS,
United Kingdom

(72) Inventor(s)

David Graham Taylor

(74) Agent and/or Address for Service

Guy Selby-Lowndes
Moonrakers, Durfold Wood, Plaistow,
BILLINGSHURST, West Sussex, RH14 0PL,
United Kingdom

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(56) Documents Cited

GB 2288007 A GB 0594515 A GB 0426575 A
GB 0356224 A WO 99/04215 A1

(58) Field of Search

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INT CL⁶ F41A 21/30 21/32 21/34
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(54) Abstract Title

Device for occluding light generated by incandescent gases

(57) The device for occluding light generated by incandescent gases comprises a cylindrical body portion 1 which is perforated 2 to permit the escape of gases from a burning propellant and which has a tubular cavity 6 along the axis of the cylinder with fitting means 3 adapted to secure attachment of one end of the cylindrical body portion to a muzzle of a firearm. The axis of the cylinder is aligned with that of the firearm barrel and the cylindrical body portion is constructed to allow the passage of gases outwardly without substantial transmission of light. In one embodiment the cylindrical body portion comprises a perforated outer tube containing one or more layers of mesh, perforated film, open foam, or granular packing material. The perforations may be shielded 8 to prevent the emission of light. In an alternative embodiment the cylindrical body portion is formed from a rigid open pore material such as a synthetic polymer, ceramic or glass foam or a honeycomb material formed from metal or synthetic polymer.

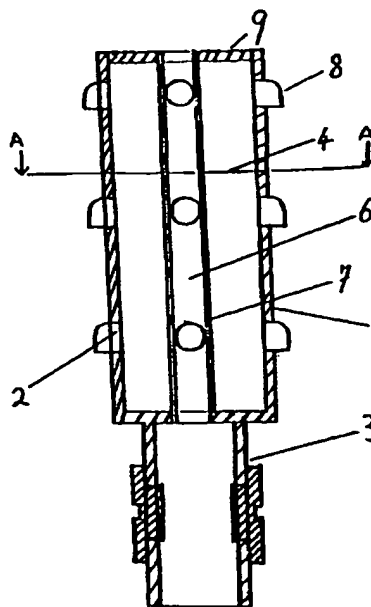


FIGURE 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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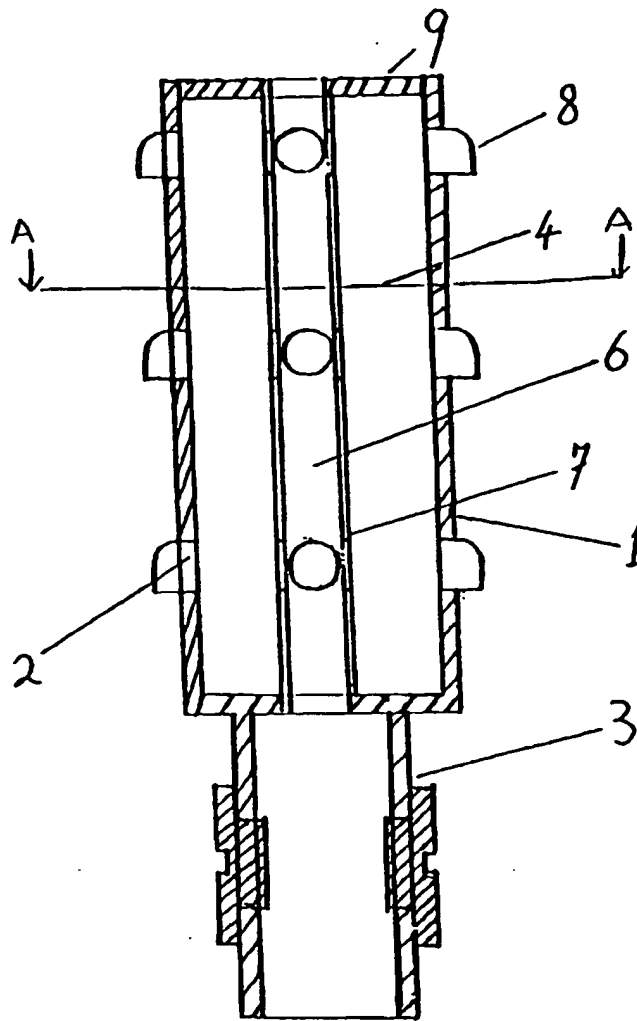


FIGURE 1

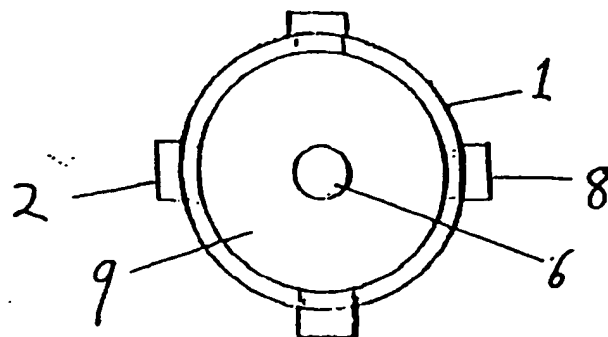


FIGURE 2

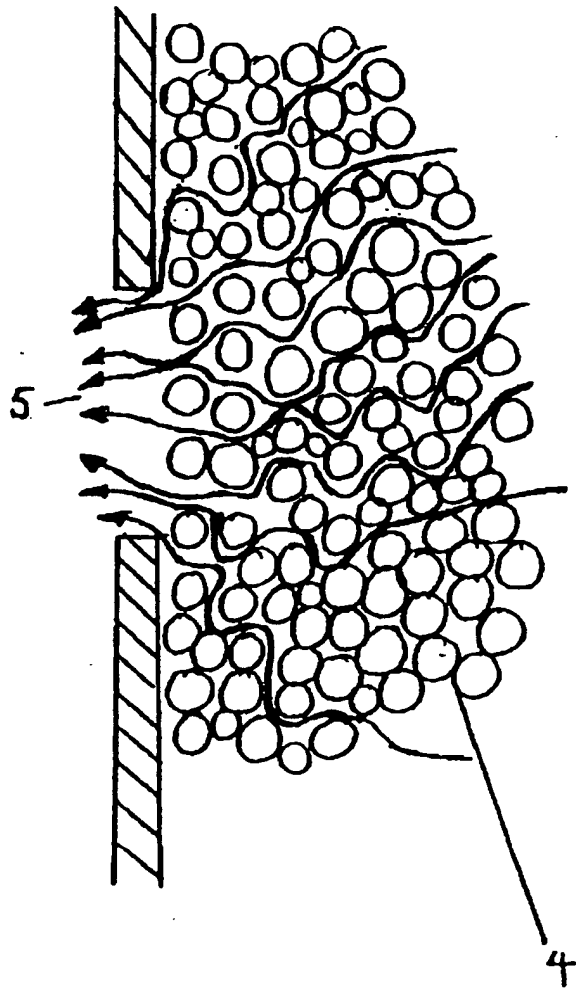


FIGURE 3

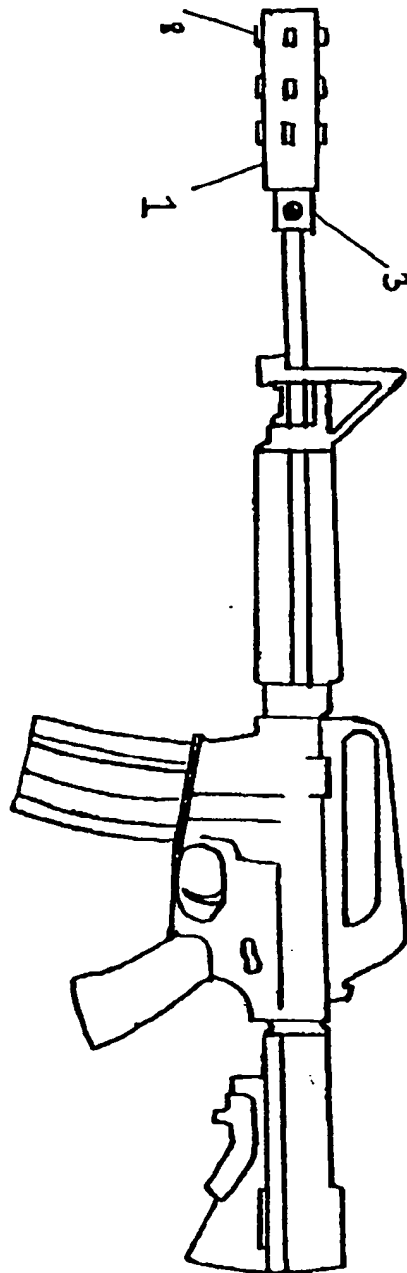


FIGURE 4

DEVICE FOR OCCLUDING LIGHT GENERATED BY INCANDESCENT GASES.

This invention relates to a device for occluding the light generated by incandescent gases.

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Burning gases generate heat and light. In some circumstances, such as during the burning of propellants in firearms, the release of light can be a disadvantage. In the case of a firearm the combustion of a propellant
10 creates gaseous products which expand rapidly due to the heat generated. The pressure generated drives a projectile along a barrel which it leaves at a considerable velocity. The gases driving the projectile are released after the projectile has left the barrel and their
15 supersonic velocity creates a shock wave which is heard as a loud bang. The combustion is seldom complete so that the released gases are usually incandescent creating a short flash as well as a bang when the projectile leaves the barrel.

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The flash when a firearm is discharged can be very bright and is very noticeable at night or when the fired from a position having a dark background. The high visibility of the flash from a firearm enables the position
25 of the firer to be located easily by an enemy observer. The flash also affects the firer as it dazzles him impairing his vision for long periods at night and obscuring the target by day when the effect of firing needs to be observed. At night the flash can have a deleterious
30 effect on image intensifiers, infra-red viewers and similar equipment.

Tests have shown that well concealed soldiers using weapons whose flash is also concealed are significantly
35 more able to survive in combat conditions than similar

soldiers whose weapon flashes are not concealed.

A number of devices have been proposed to eliminate both the flash and the sound created when a weapon is fired. On type of device is the so-called "silencer" or sound moderator which is attached to the muzzle of a weapon. Such devices comprise a tube of greater diameter than the weapon barrel which contains a plurality of baffles having a central portion which allows passage of a projectile. The gases released from the barrel slow down to subsonic velocity before leaving the weapon thereby reducing or eliminating any sound. This type device also has the effect of concealing the light generated by the initially incandescent gas. While such devices are useful in some specialist operations their general use is avoided as they considerably increase the weight and balance of the weapon to which they are fitted making them unwieldy. They also reduce the accuracy as standard sights cannot be used and the velocity of any discharged projectile is reduced. The effectiveness of sound moderating devices requires extensive cleaning after use as the slowed and cooled gases create deposit carbon and other products that would normally be discharged as smoke.

In many operational situations the noise generated by the use of firearms may be not a general problem. For soldiers in the field the sound of a weapon being fired is an important signal of approaching danger, alerting others and indicating the direction of the threat. The sound of friendly fire is also morale boosting and indicates the effectiveness of the response to an enemy attack. The noise of weapons being fired is also frightening to an approaching enemy and may reduce his determination to press home an attack.

Another class of device fitted or integral with firearms is the flash hider or eliminator. These devices screen the flash of a discharging firearm from the firer and hence enhance the ability of the firer to aim his
5 weapon. Such devices are fitted to most infantry rifles and machine guns. They typically consist of cone-shaped extensions to the barrel of a weapon or of a series of slots that divert the escaping gases into a direction that is not directly in the firers sight line. Neither device
10 fully eliminates the flash when a weapon is fired so they do not solve the problem of interference with night vision and they do not conceal the flash from an enemy in front of the weapon.

15 Flash from a discharging firearm can be eliminated by extending the barrel of the weapon and/or reducing the amount or nature of the propellant charge. Lengthening the barrel makes a weapon unwieldy and difficult to use in combat situations. Modification of the propellant charge
20 leads to poor ballistic characteristics and loss of accuracy.

The present invention provides a small lightweight device that can be fitted to or incorporated into the
25 construction of a firearm such as a rifle, machine gun or cannon to eliminate any flash produced when the weapon is fired.

According to the present invention there is provided a
30 device for occluding light generated by incandescent gases comprising a cylindrical body portion which is perforated to permit the escape of gases from a burning propellant and which has a tubular cavity along the axis of the cylinder, fitting means adapted to secure attachment of one end of the cylindrical body portion to a muzzle of a firearm so
35 that the axis of the cylinder is aligned with that of the

firearm barrel and wherein the cylindrical body portion is constructed to allow the passage of gases outwardly without substantial transmission of light.

5 The cylindrical body portion may comprise a perforated outer tube containing one or more layers of mesh, perforated film, open foam, or granular packing material so arranged that the axis has a free central passageway having a diameter sufficient to allow the passage of a bullet or
10 other projectile discharged from the barrel to which it is fitted. The outer tube may be formed from a metal or a heat resistant synthetic polymer material. To ensure minimum weight with adequate strength the metal is preferably thin steel, aluminium, titanium or alloys thereof. Synthetic
15 resin bonded glass fibre may be used to form a non-metallic outer tube. The outer tube is perforated to allow the passage of gases and preferably the perforations are shielded to prevent the emission of light.

20 In an alternative embodiment the cylindrical body portion may be formed from rigid open pore synthetic polymer, ceramic or glass foam. In the case of synthetic polymers the material must be able to withstand the impact of high pressure gases at a high temperature without
25 combustion or melting. Some polyurethane foams can be used for limited use as disposable light occluding devices. Honeycomb materials formed from metal or synthetic polymer may be used as an alternative to open pore film.

30 In practice it is found that fitting of the device to a firearm can moderate the amount of sound emitted when the weapon is discharged.

35 The most important properties of the device whether in the form of a filled tube or a self-supporting cylinder are

that the material lining the inner passage along the axis is capable of withstanding intermittent high pressure from discharged gases without substantial deformation and that it can withstand the high temperatures, up to 1000 degrees
5 Celcius, of the discharged gases.

In order that the invention may be clearly understood one form thereof will now be described, with reference to the accompanying drawings, in which:

10 Figure 1 is a cross-sectional side view of one form of the device for occluding light according to the invention,

Figure 2 is a cross-section across the line A-A of the device shown in Figure 2,

Figure 3 shows the path followed by gases leaving a
15 section of a device according to the invention, and

Figure 4 shows an assault rifle fitted with a device for occluding light in accordance with the invention.

The device, see Figure 1, consists of a cylindrical
20 body 1 in the form of a metal tube perforated with vents 2. One end of the body 1 is fitted with means 3 enabling it to be attached to the muzzle of a firearm (not shown). The interior of the tube 1 is packed in the section 4 with light absorbing material which allows the passage of hot
25 gases from section 4 to the vents 2. A centrally passageway 6 allows the free passage of a projectile, not shown, through the device whenever the firearm is discharged. The passageway 6 is the embodiment shown is lined with a metal tube 7 to retain the contents of the
30 section 4 and prevent interference with projectiles passing through the passageway 6. In the preferred embodiment shown the vents 2 are covered with shields 8.

When a firearm fitted with the device is discharged a
35 projectile passes through the passageway 6 followed by hot

and incandescent gases. The presence of the tube 7 assists in cooling the hot gases which pass through the perforations into the section 4 where they are further cooled and their velocity reduced until the gases exit to the atmosphere 5 through the vents 2, see Figure 3.

The attachment of a device according to the invention to a firearm is shown in Figure 4.

10 The section 4 may be filled with a variety of materials which allow the passage of hot gases without deforming under the pressure of the gases or melting due to their temperature. Such fillings may include metal, mineral or ceramic meshes, granules or fibres of similar
15 materials. The gases exit through a tortuous route created by the pores or interstices in the filling. The large surface area provided by the filling assists in cooling the gases as they pass through.

20 The length of the tube 1 may be chosen according to the type of weapon and propellant encountered. The length must be sufficient that when a projectile issues from the tube 1 no light from gas combustion is seen by the firer.

25 The device will accumulate combustion and incomplete combustion products such as carbon and oil in use. The accumulation may be removed by washing the device after removal from a firearm or the device may be discarded.

CLAIMS

1. A device for occluding light generated by incandescent gases comprising a cylindrical body portion which is
5 perforated to permit the escape of gases from a burning propellant and which has a tubular cavity along the axis of the cylinder, fitting means adapted to secure attachment of one end of the cylindrical body portion to a muzzle of a firearm so that the axis of the cylinder is aligned with
10 that of the firearm barrel and wherein the cylindrical body portion is constructed to allow the passage of gases outwardly without substantial transmission of light.
2. The device as claimed in claim 1, characterised in
15 that the cylindrical body portion comprises a perforated outer tube containing one or more layers of mesh, perforated film, open foam, or granular packing material so arranged that the axis has a free central passageway having a diameter sufficient to allow the passage of a bullet or
20 other projectile discharged from the muzzle to which it is fitted.
3. The device as claimed in claim 1 or claim 2, characterised in that the outer tube is formed from metal.
25
4. The device as claimed in claim 1 or claim 2, characterised in that the outer tube is formed from a heat resistant synthetic polymer material.
- 30 5. The device as claimed in claim 2, characterised in that the perforations are shielded to prevent the emission of light.
6. The device as claimed in claim 1, characterised in
35 that the cylindrical body portion is formed from a rigid open pore material.

7. The device as claimed in claim 6, characterised in that the rigid open pore material is a synthetic polymer, ceramic or glass foam.

5 8. The device as claimed in claim 6, characterised in that the rigid open pore material is a honeycomb material formed from metal or synthetic polymer.

9. Devices for occluding light generated by incandescent
10 gases as claimed in claim 1 and as herein described.

10. Devices for occluding light generated by incandescent gases as herein described and illustrated with reference to the accompanying drawings.

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Application No: GB 9905316.7
Claims searched: 1 to 10

Examiner: Trevor Berry
Date of search: 11 May 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.Q): F3C (CLA, CP4)
Int CI (Ed.6): F41A 21/30, 21/32, 21/34
Other: ONLINE: EPODOC, WPI, JAPIO

Documents considered to be relevant:

| Category | Identity of document and relevant passage | Relevant to claims |
|----------|---|--------------------|
| X | GB 2288007 A RHEINMETALL-note page 10 | 1-4 |
| X | GB 0594515 BURNEY | 1 |
| X | GB 0426575 BLUNDELL-note figures 5 to 8 | 1-4 |
| X | GB 0356224 AUTOMATIC GUNS | 1 |
| P, X | WO 99/04215 A1 ULTRAMET-noe figure 1 | 1, 6, 7 |

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